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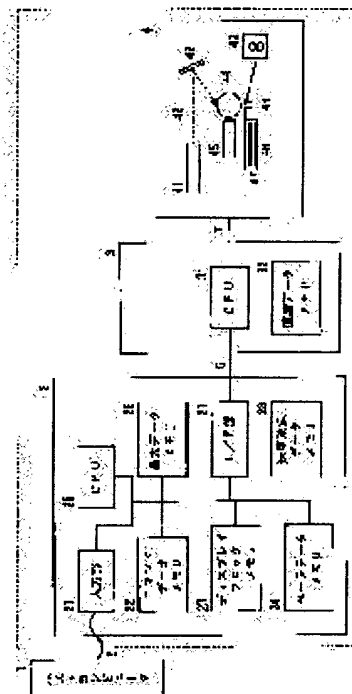
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(54) IMAGE FORMING APPARATUS

(57)Abstract:

PURPOSE: To provide an image forming apparatus enhanced in printing efficiency capable of changing an image forming speed corresponding to the data quantity of a page.

CONSTITUTION: In an image forming apparatus equipped with a band data storage means 23 storing the data of a plurality of bands formed by dividing the image data corresponding to one page and a page data storage means 24 storing the data corresponding to one page constituted of the data of a plurality of the bands transmitted from the band data storage means, image forming speed setting means 25, 26, 28 automatically setting the image forming speed of the page containing the data of the bands on the basis of the max. data quantity of the bands stored in the band data storage means are provided. When the max. data quantity of the bands is much and a time is taken in the development from band data to page data, an image forming speed is set so as to become slow and, when the max. data quantity of the bands is little and a time is not taken in the development to page data, the image forming speed is set so as to become fast.



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CLAIMS

[Claim(s)]

[Claim 1] A band information-storage means to memorize the information on each band when dividing the picture field for 1 page into two or more bands. A page data-storage means to memorize the information for 1 page constituted by the information on two or more bands transmitted from the aforementioned band information-storage means. It is image formation equipment equipped with the above, and is characterized by establishing an image formation speed setting means to set automatically the image formation speed of a page including the information on the aforementioned band, based on the maximum amount of information of the band memorized by the aforementioned band information-storage means.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention increases the efficiency of printing about the image formation equipment which prints on a form based on the data transmitted from the computer etc. by setting up printing speed especially according to the amount of data of each page.

[Description of the Prior Art] In recent years, the field of the invention of the image formation equipment connected and used for it by the spread of personal computers etc. is expanded, and the image formation equipment which has various functions according to each field is used.

[0002] In the page printer which is one of such the image formation equipment, in order to print a page unit, whenever it provides the page data memory which memorizes the image data for 1 page and the image data for 1 page is transmitted to this page data memory, print operation is started, and it is printing 1 page at a time.

[0003] With this image formation equipment, before sending the data transmitted from the host computer etc. to page data memory, divide the amount of data for 1 page into plurality, it is made to store temporarily at buffer memory, and the difference in a data transfer rate is adjusted by transmitting data to page data memory from this buffer memory.

[0004] This conventional kind of image formation equipment consists of the image-processing section 2 which changes into the page data in every page the image data transmitted through the cable 5 from a host computer 1, the image formation section 4 which performs printing of a up to [a form], and an image formation control section 3 which controls the image formation section 4, as shown in drawing 9.

[0005] The input section 21 which receives the command with which the image-processing section 2 has been sent from the host computer 1, and image data, The command data memory 22 which stores the received command and data, The display list memory 29 which divides and memorizes the amount of data for 1 page to plurality, It has the page data memory 24 which memorizes the page data for 1 page, the interface section 27 which outputs data to the image formation control section 3 through a cable 6, and the central processing unit (CPU) 25 which controls image data processing according to the received command.

[0006] Moreover, the image formation control section 3 is equipped with the speed data memory 32 which memorizes the periodic data about the image formation speed of the image formation section 4, and CPU31 which controls operation of the image formation section 4 by the period read from the speed data memory 32.

[0007] Moreover, the image formation section 4 is equipped with the laser unit 41 which generates the laser beam 42 according to page data, the mirror 43 which reflects a laser beam, the photo conductor 44 with which a latent image is formed of a laser beam 42, the development counter 45 which changes a latent image into a visible image, the form cassette 46 which supplies a form 47, the imprint machine 48 which imprints a visible image on a form, and the fixing assembly 49 established in the visible image on a form by the case of a LASER beam printer.

[0008] With this image formation equipment, if a command and image data are received via a cable 5 from a host computer 1, it stores in the command data memory 22, after receiving these commands and data in the input section 21. CPU25 interprets each command and data which were stored in the command data memory 22, changes the image data stored there into the display list (one division when dividing the picture field for 1 page into plurality is called "band", and the image data for one band is called "display list") for every band, and stores it in the display list memory 29.

[0009] Subsequently, CPU25 transmits a part for the number band of the display list stored in the display list memory 29 to the page data memory 24, and develops it to the page data for 1 page.

[0010] Simultaneously with it, CPU25 issues [operating the image formation section 4 to the image formation control section 3 via a cable 6, and] an instruction. CPU31 of the image formation control section 3 which received the instruction takes out a period from the periodic data (there is only one) memorized by the speed data memory 32, and operates it via a cable 7 using the period which took out operation of the image formation section 4.

[0011] After the expansion to page data is completed, CPU25 of the image-processing section 2 outputs a print signal to the image formation control section 3 via a cable 6, and the image formation section 4 checks whether it is a printable state. When it can print, CPU31 of the image formation control section 3 will output a vertical synchronizing signal to the image-processing section 2, if the photo conductor 44 of the image formation section 4 and the motor of laser unit 41 grade are made to turn on, laser luminescence etc. is prepared and preparation is completed.

[0012] If it confirms whether the vertical synchronizing signal to which a printing start is urged was outputted and a vertical synchronizing signal is turned on [it], CPU25 of the image-processing section 2 will take out page data from the page data memory 24 immediately, and will send them to the image formation control section 3.

[0013] Simultaneously, CPU25 develops the display list of [for the number band which constitute the following page data in the page data memory 24 which became empty] from the display list memory 29.

[0014] On the other hand, the image formation control section 3 controls the image formation section 4 as follows.

CPU31 of the image formation control section 3 transmits the inputted page data to the laser unit 41, and the laser unit 41 generates the laser beam 42 according to the transmitted data. This laser beam 42 is irradiated on a photo conductor 44, exposes a photo conductor 44, and forms a latent image.

[0015] Subsequently, negatives are developed by adding development bias, a latent image is visualized, and a visible image makes it generate on a photo conductor 44 in a development counter 45. Subsequently, paper is fed to a form 47 from the form cassette 46, imprint bias is hung on the imprint machine 48 to the timing to which a picture appears on a form, and a visible image is imprinted in a form 47.

[0016] Next, a visible image is fixed to a form 47 in process in which a form passes a fixing assembly 49, it confirms whether paper was delivered to the form 47, each motor is turned off, and printing is ended.

[0017]

[Problem(s) to be Solved by the Invention] Since image formation speed is decided by this conventional image formation equipment with one kind of periodic data memorized by the speed data memory 32, regardless of the amount of data of the page which it is going to print, it is always constant speed.

[0018] If this image formation speed is early made uniform, in printing a complicated page with much amount of data, the expansion to page data from a display list does not catch up with image formation speed, but causes [of an error] generating. But in having set up image formation speed late according to printing of a complicated page, when printing a page with little amount of data, much time will be consumed. Therefore, the printing efficiency of conventional image formation equipment was not able to be called good thing.

[0019] this invention solves such a conventional trouble and aims at offering the high image formation equipment of printing efficiency into which image formation speed is changeable according to the amount of data of a page.

[0020]

[Means for Solving the Problem] Then, a band information-storage means to memorize the information on each band when dividing the picture field for 1 page into two or more bands in this invention, In image formation equipment equipped with a page data-storage means to memorize the information for 1 page constituted by the information on two or more bands transmitted from the band information-storage means Based on the maximum amount of information of the band memorized by the band information-storage means, an image formation speed setting means to set automatically the image formation speed of a page including the information on the band is established.

[0021]

[Function] Therefore, there is much maximum amount of information of a band, therefore when the expansion to page data from band information takes time, image formation speed is set up late, and there is little maximum amount of information of a band, therefore when the expansion to page data from band information does not take time, image formation speed can be set up quickly, and efficient printing is attained.

[0022]

[Example] The image formation equipment in the example of this invention equips the image-processing section 2 with the display block memory 23 which stores temporarily the data which should be developed to page data, the maximum data memory 26 memorized about the maximum amount of data contained in the band developed by the page data for 1 page, and the speed determination data memory 28 which memorizes two or more periodic data which determine image formation speed, as shown in drawing 1 . Moreover, the speed data memory 32 of the image formation control section 3 has memorized two or more same periodic data as what the speed determination data memory 26 has memorized. Other composition does not have conventional equipment (drawing 9) and a change.

[0023] From the data which input from a host computer 1 and are stored in the command data memory 22, CPU25 of the image-processing section 2 creates a display block, and stores it in the display block memory 23.

[0024] As this display block is shown in drawing 3 , it consists of the data showing the amount of information of each band developed by the page data for 1 page, and the display information on the band and display information is shown

in drawing 2 , in each band, it consists of the information in which position in a band an image and a text are, and the image data of the image linked to the information, or a text.

[0025] Although the amount of information of the band in a display block totals an image and the amount of information of the text itself, even if the amount of information of an image and a text is equal, when a difference arises at the expansion time to page data, the amount of information of an image is carried out several times, and it totals it so that it may be proportional to expansion time.

[0026] Moreover, the value showing the biggest band amount of information in the display block for 1 page stored in the display block memory 23 is stored in the maximum data memory 26.

[0027] Printing operation in the image formation equipment of an example is explained along with the flow chart of drawing 5 - drawing 8 as what divides 1 page into five bands, and changes the speed of the image formation section 4 to a three-stage hereafter.

[0028] Step 1; input data (a command, picture image, etc.) are incorporated by the input section 21 of the image-processing section 2 via a cable 5 from a host computer 1, and it is stored in the step 2; command data memory 22. the data with which step 3; CPU25 was incorporated by the command data memory 22 to a display block -- creating -- the display block memory 23 -- storing -- step 4; -- CPU25 stores the biggest thing in the maximum data memory 26 again among the band amount of information in the display block stored in the display block memory 23

[0029] Step 5; next CPU25 will judge whether the expansion to page data from display information meets the deadline, if image formation speed is set as how much at the time of this maximum band amount of information. Therefore, when image formation speed is set up the quickest period 1 in three kinds of periods (shown in drawing 4) currently held at the speed determination data memory 28 The maximum amount of data which is [the expansion to page data from display information] of use, If the value which compares the value stored in the maximum data memory 26, judges which is small, and is stored in the step 6; maximum data memory 26 is smaller, since it means that the expansion to page data meets the deadline An instruction is sent so that image formation speed may be controlled a period 1 to CPU31 of the image formation control section 3.

Step 7; CPU31 which received the instruction takes out a period 1 out of the periodic data (it is the same as drawing 4) memorized by the speed data memory 32, and controls operation of the image formation section 4 using this period 1.

[0030] Moreover, when the value stored in the maximum data memory 26 is larger in Step 5 Since it means that the expansion to page data does not meet the deadline at the image formation speed of a period 1, it progresses to Step 8. step 8; CPU25 The maximum amount of data which is [the expansion to page data from display information] of use when image formation speed is set the quick period 2 stored in the speed determination data memory 28 to the second, The value stored in the maximum data memory 26 is compared, and it judges which is small, and if the value stored in the step 9; maximum data memory 26 is smaller, an instruction will be sent so that image formation speed may be controlled a period 2 to CPU31 of the image formation control section 3.

Step 10; CPU31 which received the instruction takes out the period 2 memorized by the speed data memory 32, and controls operation of the image formation section 4 using this period 2.

[0031] Step 11; when the value stored in the maximum data memory 26 is larger in Step 8 again, an instruction is sent so that image formation speed may be controlled a period 3 to CPU31 of the image formation control section 3.

Step 12; CPU31 which received the instruction takes out the period 3 memorized by the speed data memory 32, and controls operation of the image formation section 4 using this period 3.

[0032] Step 13; then CPU25 develop image data from the display information on the display block memory 23, and store the page data actually printed in the page data memory 24.

[0033] Step 14; a print signal is sent to the image formation control section 3 from the image-processing section 2, the step 15; image formation section 4 checks whether it is a printable state, and when step 16; printing is possible, CPU31 of the image formation control section 3 makes the photo conductor 44 of the image formation section 4, and the motor of laser unit 41 grade turn on, and prepares laser luminescence etc.

[0034] Step 17; shortly after confirming whether the vertical synchronizing signal for a printing start was outputted to the image-processing section 2 and turning on [it] a step 18; vertical synchronizing signal, CPU25 of the image-processing section 2 takes out page data from the page data memory 24, and sends them to the image formation control section 3.

[0035] CPU31 of the image formation control section 3 controls the image formation section 4 as follows.

Step 19; the laser beam 42 with the laser power according to the transmitted data is made to emit light from the laser unit 41, it exposes by irradiating a photo conductor 44, a latent image is visualized with the step 20; development counter 45, and a visible image is generated on a photo conductor 44.

step 21; -- the timing to which a visible image appears in a form -- a form 47 -- a cassette 46 -- feeding paper -- a form top -- a visible image -- imprinting -- step 22; -- subsequently to a form, a picture is fixed by the fixing assembly 49,

when it confirms whether the step 23; form delivered paper and step 24; delivery has finished, each motor is turned off and printing is ended

[0036] Thus, when image formation is performed at the speed when it is judged whether the expansion to page data from display information meets the deadline and it does, the image formation equipment of an example is not [it is set as the quickest image formation speed,] of use and it is set as the following speed, it is judged whether the expansion to page data from display information meets the deadline.

[0037] Therefore, each page is an image formation speed for which the expansion to page data from display information is enough, and, moreover, will be printed at the quickest image formation speed of them.

[0038] In addition, although the example explained the LASER beam printer, of course, it is also possible to apply this invention to other printers.

[0039]

[Effect of the Invention] With the image formation equipment of this invention, it is the range which does not generate a printing error according to the amount of information of the page which is going to print image formation speed, and since it can change into a quicker speed automatically, efficient printing is possible and error generating is also suppressed, so that clearly from explanation of the above example.

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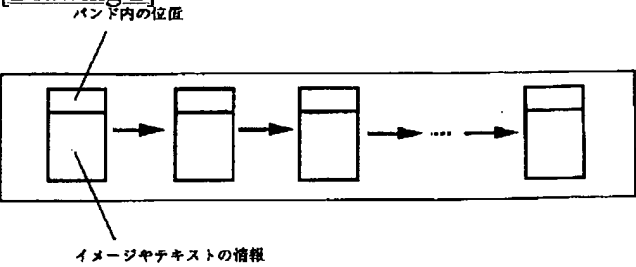
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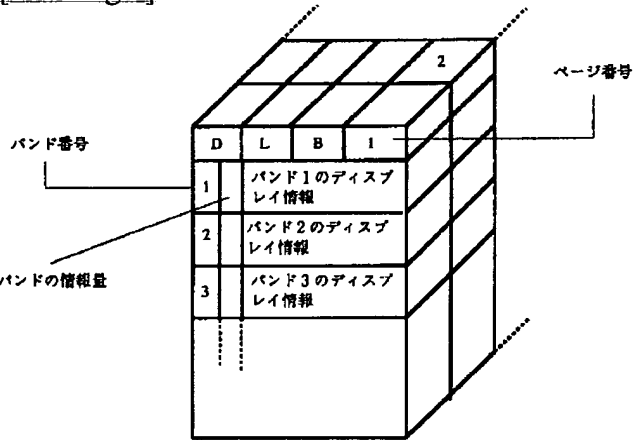
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DRAWINGS

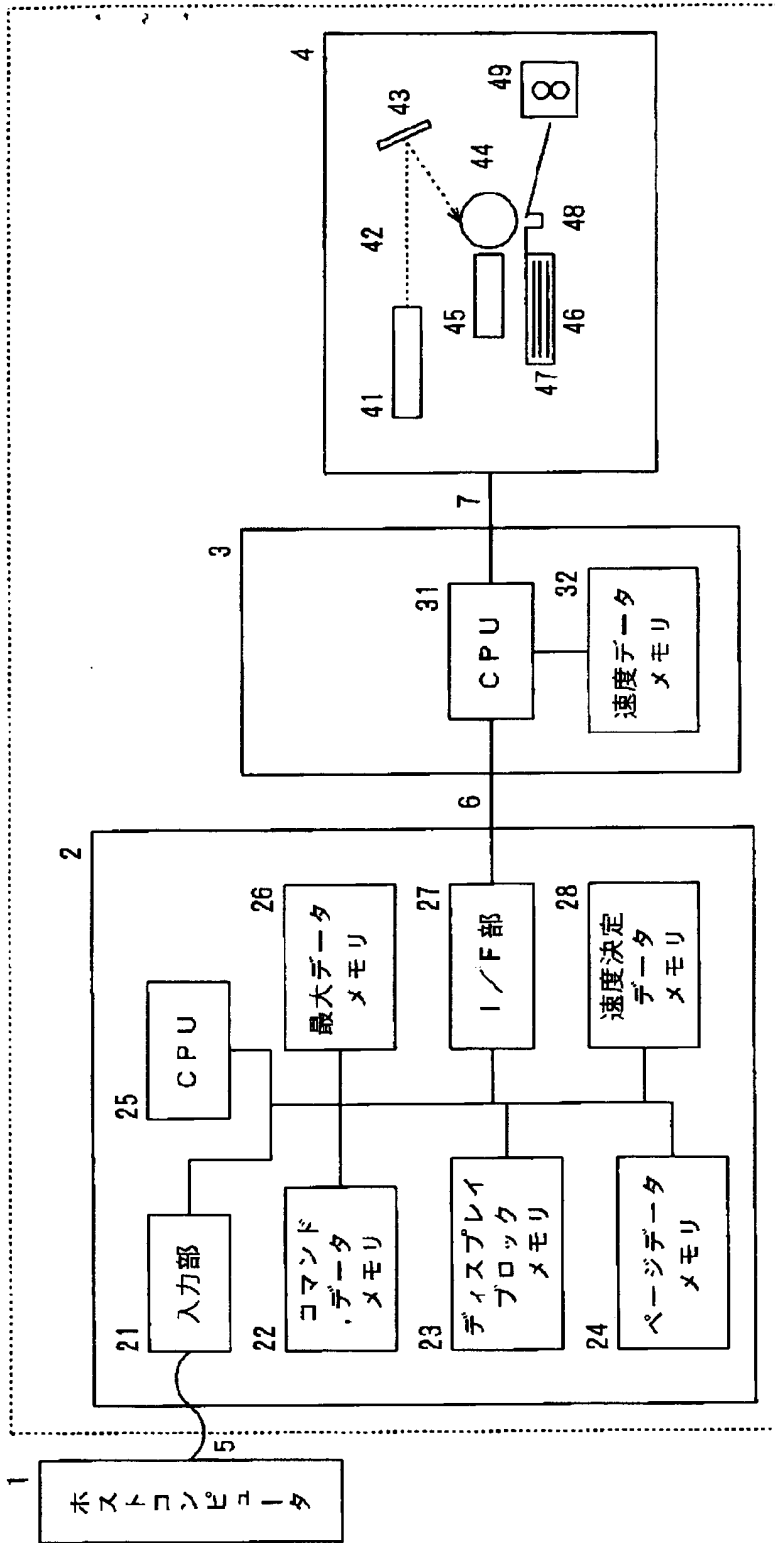
[Drawing 2]



[Drawing 3]



[Drawing 1]



[Drawing 4]

最も遅い画像形成速度の周期 3



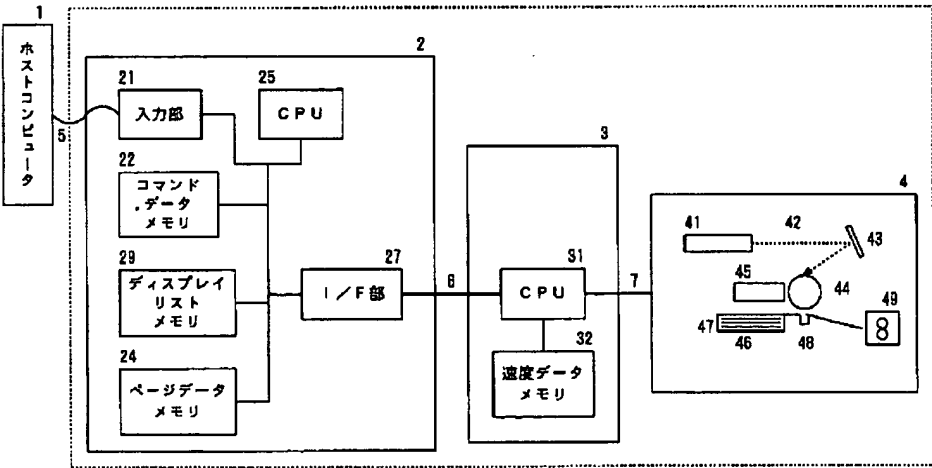
中間の画像形成速度の周期 2



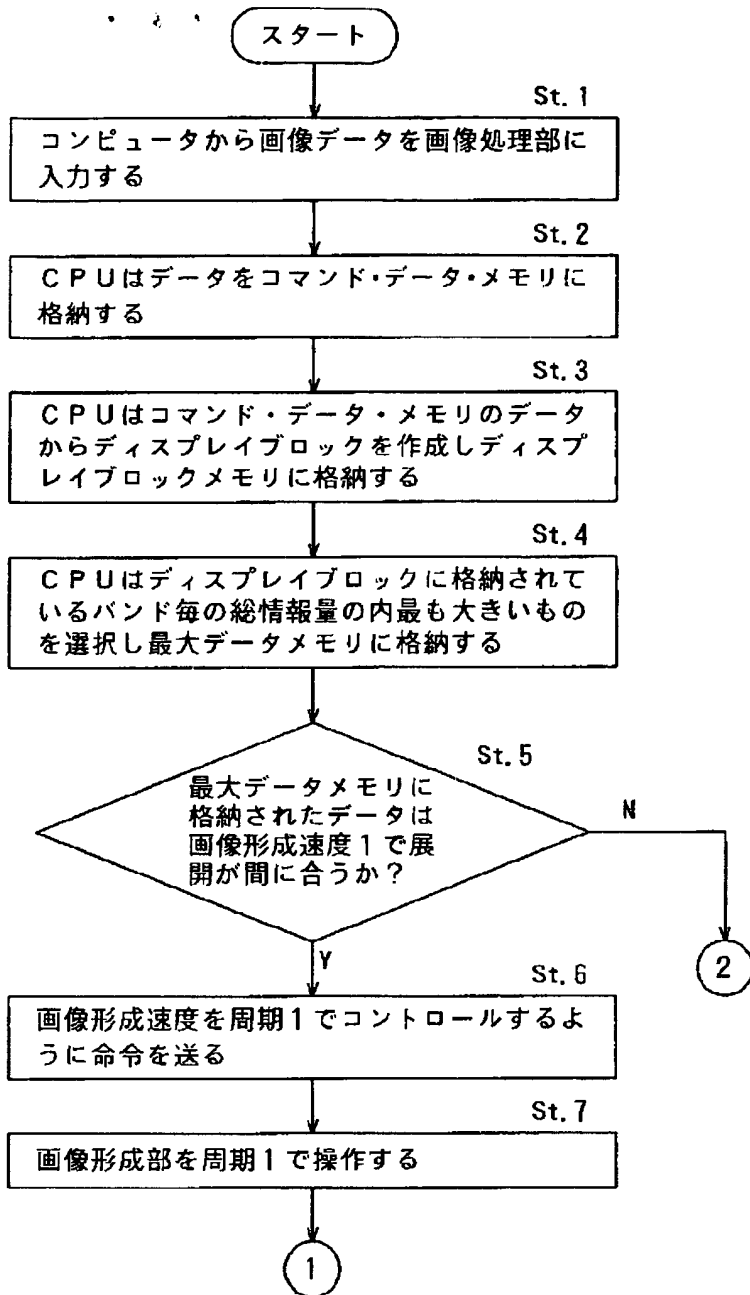
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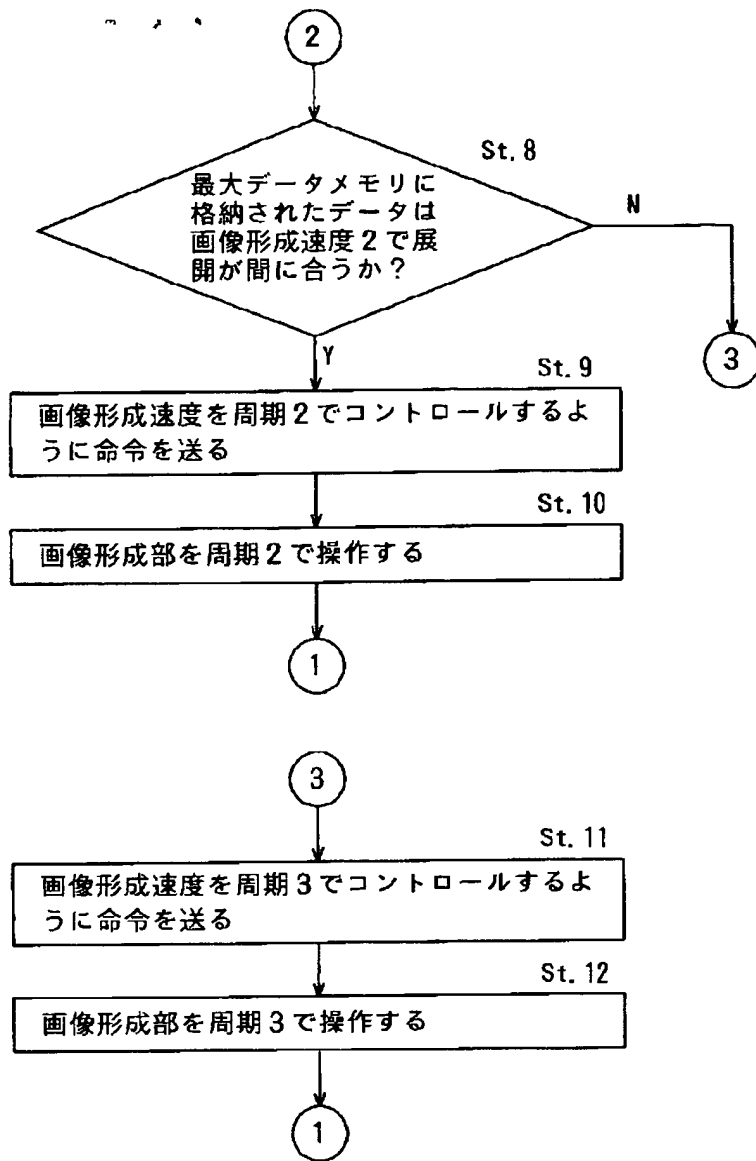
[Drawing 9]



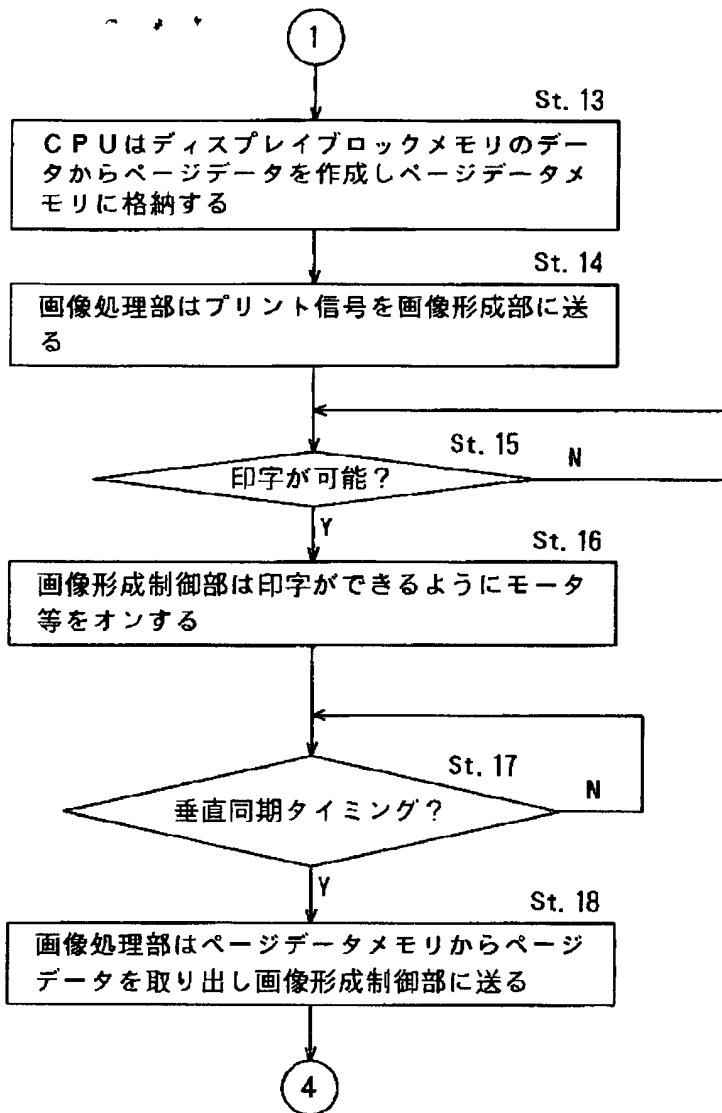
[Drawing 5]



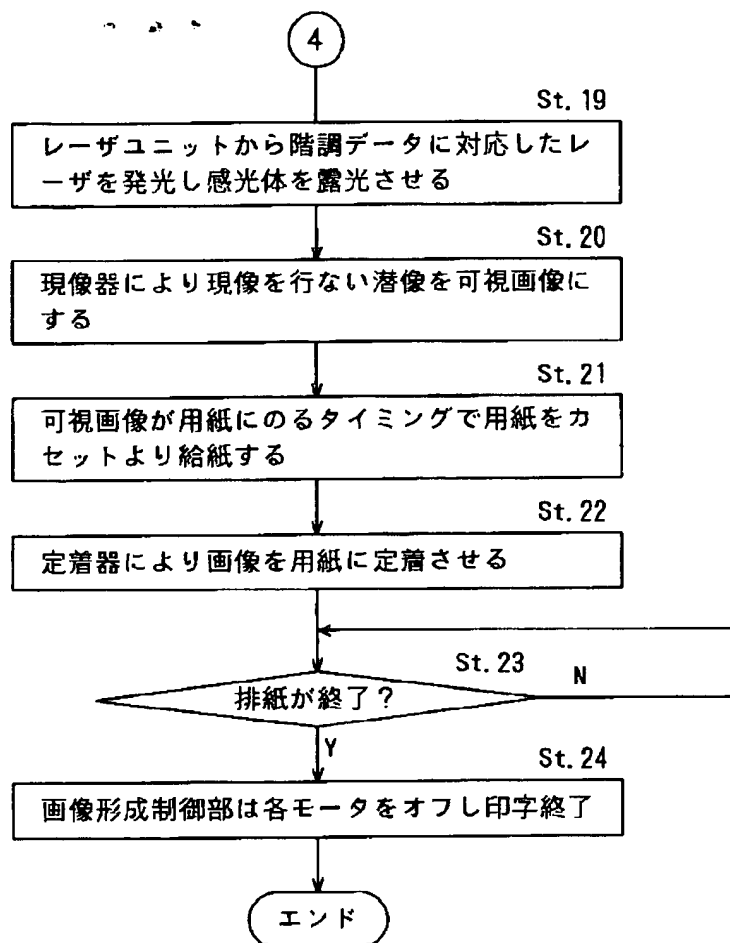
[Drawing 6]



[Drawing 7]



[Drawing 8]



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